REMARKS

Applicants have amended claims 19, 24, 26, 27, 34, and 36, and have canceled claims 1-18, 20, 23, 25, 28, 33, and 35, during prosecution of this patent application. Applicants are not conceding in this patent application that said amended and canceled claims are not patentable over the art cited by the Examiner, since the claim amendments and cancellations are only for facilitating expeditious prosecution of this patent application. Applicants respectfully reserve the right to pursue said amended and canceled claims, and other claims, in one or more continuations and/or divisional patent applications.

The Examiner rejected claims 1-36 under 35 U.S.C. § 101 because the claimed invention is allegedly directed to non-statutory subject matter.

The Examiner rejected claims 1-36 under 35 U.S.C. § 102(a) as allegedly being anticipated by Li et al., (("Process Variation Dimension Reduction Based on SVD") herein after Li).

The Examiner rejected claims 11, 12, 29 and 30 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Li et al. (("Process Variation Dimension Reduction Based on SVC") herein after Li).

Applicants respectfully traverse the § 101, § 102 and § 103 rejections with the following arguments.

35 U.S.C. § 101

The Examiner rejected claims 1-36 under 35 U.S.C. § 101 because the claimed invention is allegedly directed to non-statutory subject matter.

The Examiner argues: "The claims do not transform an article or physical object to a different state or thing and do not produce a concrete, tangible, and useful result. The claims are directed to an abstract mathematical idea. The claims are pure mathematical manipulation of data that are not believed to be tied to a practical application. However, in the event that the applicant believes that there is a practical application the claims are so broad and sweeping as to encompass every substantial practical application and thus preempt the abstract idea."

Since claims 1-18, 20, 23, 25, 28, 33, and 35 have been canceled, the rejection of claims 1-18, 20, 23, 25, 28, 33, and 35 under 35 U.S.C. § 101 is moot.

Applicants respectfully contend that claims 19, 21-22, 24, 26, 27, 29-32, 34, and 36 are tangible and concrete, at least because of the following claimed features: "storing the p clusters in a computer-readable storage device" claims (19, 21-22, 24, 26), and "storing the list of clusters comprising all of said inserted new clusters in a computer-readable storage device" (claims 27, 29-32, 34, 36).

In addition, Applicants assert that the pending claims creates a data structure: by the "partitioning" step in claims 19, 21-22, 24, and 26, and by the "generating", "selecting", "merging", and "inserting" steps in claims 27, 29-32, 34, and 36. Applicants note that the data structure created in Applicants' claims is in conformity with the IEEE definition of "data structure", namely "a group of digital data fields organized in some logical order for some

specific purpose". See "IEEE 100 The Authoritative Dictionary of IEEE Standards Terms 273 (7th ed.).

Morever, Applicants respectfully dispute the Examiner's allegation that "the claims are so broad and sweeping as to encompass every substantial practical application and thus preempt the abstract idea". Applicants assert that claims 19, 21-22, 24, 26, 27, 29-32, 34, and 36 are significantly limited in scope by claiming the use of "affinity" in consideration of the fact that the claimed "affinity" must conform to the definition of "affinity" that appears in Applicants' specification.

In particular, claims 19 and 27 recite the following features: "said partitioning comprising an affinity-based merging of clusters of pairs of clusters of the matrix A based on **an affinity** between the clusters in each pair of clusters being merged" (claim 19, emphasis added); and "said next pair of clusters having **an affinity** that is not less than **an affinity** between any pair of clusters not yet selected from the list of clusters" (claim 27, emphasis added).

Applicants not that "affinity" with respect to clusters is very specifically defined in Applicants' specification as follows:

"Generally, a cluster includes one or more columns of the coefficient matrix A as will be seen *infra* through the cluster merging step 59. Each cluster has a "leader" which is the column having the largest norm of all of the columns in the cluster. Thus initially, every column of the coefficient matrix A is both a cluster and a leader of the cluster, and the initial number of clusters is equal to n. Note that **the affinity between two clusters is defined as the affinity between the leaders of the two clusters.**" (specification, page 17, line 18 – page 18, line 2, emphasis added); and

"The affinity between the two vectors y and w is now **defined** to be

$$\text{affinity} = 1 - \frac{\sigma_2(S)}{\sigma_1(S)}$$

$$= 1 - \frac{\sqrt{\lambda_2}}{\sqrt{\lambda_1}}$$

$$= 1 - \sqrt{\frac{1+\alpha^2 - \sqrt{(1+\alpha^2)^2 - 4\alpha^2(1-\beta^2)}}{1+\alpha^2 + \sqrt{(1+\alpha^2)^2 - 4\alpha^2(1-\beta^2)}}} \qquad (10)"$$

(specification, page 16, lines 9-13, emphasis added).

Furthermore, the parameters α, λ_1, λ_2, σ_1, and σ_2 appearing in Equation (10) are **defined** as follows:

"the norm-ratio α between y and w is defined as

$$\alpha = \frac{\|y\|}{\|w\|} \qquad (8) \quad "$$

(specification, page 13, lines 14-16, emphasis added);

"
$$\lambda_{1,2} = \frac{(1+\alpha^2) \pm \sqrt{(1+\alpha^2)^2 - 4\alpha^2(1-\beta^2)}}{2}$$

But the singular values $\sigma_1(S)$ and $\sigma_2(S)$ of S are $\|w\|$ times the square-root of λ_1 and λ_2,

respectively, which are:

$$\sigma_1(S) = \|w\|\sqrt{\lambda_1}, \quad \sigma_2(S) = \|w\|\sqrt{\lambda_2} \quad "$$

(specification, page 16, lines 2-8).

Based on the preceding arguments, Applicants respectfully maintain that claims 19, 21-22, 24, 26, 27, 29-32, 34, and 36 are not unpatentable under 35 U.S.C. § 101.

Accordingly, Applicants respectfully request that the rejection of claims 19, 21-22, 24, 26, 27, 29-32, 34, and 36 under 35 U.S.C. § 101 be withdrawn

<u>**35 U.S.C. § 102(a)**</u>

The Examiner rejected claims 1-36 under 35 U.S.C. § 102(a) as allegedly being anticipated by Li et al., (("Process Variation Dimension Reduction Based on SVD") herein after Li).

Since claims 1-18, 20, 23, 25, 28, 33, and 35 have been canceled, the rejection of claims 1-18, 20, 23, 25, 28, 33, and 35 under 35 U.S.C. § 102(a) is moot.

Applicants respectfully contend that Li does not anticipate claims 19 and 27, because Li does not teach each and every feature of claims 19 and 27. For example, Li does not teach use of "afffinity" in the following features: "said partitioning comprising an affinity-based merging of clusters of pairs of clusters of the matrix A based on **an affinity** between the clusters in each pair of clusters being merged" (claim 19, emphasis added); and "said next pair of clusters having **an affinity** that is not less than **an affinity** between any pair of clusters not yet selected from the list of clusters" (claim 27, emphasis added).

Applicants not that "affinity" with respect to clusters is very specifically defined in Applicants' specification as follows:

"Generally, a cluster includes one or more columns of the coefficient matrix A as will be seen *infra* through the cluster merging step 59. Each cluster has a "leader" which is the column having the largest norm of all of the columns in the cluster. Thus initially, every column of the coefficient matrix A is both a cluster and a leader of the cluster, and the initial number of clusters is equal to n. Note that **the affinity between two clusters is defined as the affinity between the leaders of the two clusters.**" (specification, page 17, line 18 – page 18, line 2, emphasis added); and

"The affinity between the two vectors y and w is now **defined** to be

$$\text{affinity} = 1 - \frac{\sigma_2(S)}{\sigma_1(S)}$$

$$= 1 - \frac{\sqrt{\lambda_2}}{\sqrt{\lambda_1}}$$

$$= 1 - \sqrt{\frac{1+\alpha^2 - \sqrt{(1+\alpha^2)^2 - 4\alpha^2(1-\beta^2)}}{1+\alpha^2 + \sqrt{(1+\alpha^2)^2 - 4\alpha^2(1-\beta^2)}}} \qquad (10)"$$

(specification, page 16, lines 9-13, emphasis added).

Furthermore, the parameters α, λ_1, λ_2, σ_1, and σ_2 appearing in Equation (10) are **defined** as follows:

"the norm-ratio α between y and w is defined as

$$\alpha = \frac{\|y\|}{\|w\|} \qquad (8) \quad "$$

(specification, page 13, lines 14-16, emphasis added);

"

$$\lambda_{1,2} = \frac{(1+\alpha^2) \pm \sqrt{(1+\alpha^2)^2 - 4\alpha^2(1-\beta^2)}}{2}$$

But the singular values $\sigma_1(S)$ and $\sigma_2(S)$ of S are $\|w\|$ times the square-root of λ_1 and λ_2,

respectively, which are:

$$\sigma_1(S) = \|w\|\sqrt{\lambda_1}, \quad \sigma_2(S) = \|w\|\sqrt{\lambda_2} \quad "$$

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(specification, page 16, lines 2-8).

Applicants respectfully contend that Li's method does not utilize the "affinity" that is recited in claims 19 and 27 in consideration of the definition of "affinity" in Applicants' specification.

Based on the preceding arguments, Applicants respectfully maintain that Li does not anticipate claims 19 and 27, and that claims 19 and 27 are in condition for allowance. Since claims 21-26 depend from claim 19, Applicants contend that claims 21-26 are likewise in condition for allowance. Since claims 29-36 depend from claim 27, Applicants contend that claims 29-36 are likewise in condition for allowance.

35 U.S.C. § 103(a)

The Examiner rejected claims 11, 12, 29 and 30 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Li et al. (("Process Variation Dimension Reduction Based on SVC") herein after Li).
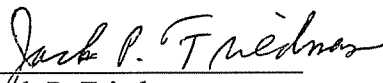
Since claims 11 and 12 have been canceled, the rejection of claims 11 and 12 under 35 U.S.C. § 103(a) is moot.

Since claims 29 and 30 depend from claim 27, which Applicants have argued *supra* to not be unpatentable over Li under 35 U.S.C. §102(a), Applicants maintain that claims 29 and 30 are likewise not unpatentable over Li under 35 U.S.C. §103(a).

CONCLUSION

Based on the preceding arguments, Applicants respectfully believe that all pending claims and the entire application meet the acceptance criteria for allowance and therefore request favorable action. If the Examiner believes that anything further would be helpful to place the application in better condition for allowance, Applicants invites the Examiner to contact Applicants' representative at the telephone number listed below. The Director is hereby authorized to charge and/or credit Deposit Account 09-0457 (IBM).

Date: 09/26/2007

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